B R U E L & K J A E R

TYPE 2107
FREQUENCY ANALYZER

Service Instructions
Frequency Analyzer

Consisting of:

Meter Circuit	2107.1
Output Amplifier	2107.2
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Removal of the Metal Case

After removing the four threaded retainers at the back of the instrument, it is possible to slide the chassis and the front panel out of the case.

Trouble Shooting

If the reason for a fault is not an obvious one such as a dead tube, broken down resistor, blown or disconnected fuse etc., then first test the voltages of all the tubes and compare them with the voltages shown in the circuit diagram in order to localize the defect. Should this method of finding the fault prove unsuccessful, then check the instrument by adopting the method described in the adjustment procedure. When the trouble has been found and remedied, the voltages and adjustments which are influenced by the remedy must be rechecked.

The tolerances stated in the instructions can only be used as a guide for adjustment and control, but any deviations must not be corrected without being sure that the tolerances of the instruments used for making the adjustment are so small as to have no influence on the measurement.

The instructions in this Manual are given purely as a guide to the service of equipment. Some faults, as f.inst. small deviations in tolerances require for their correction special control equipment and extensive experience, and in these cases it is necessary to send the instrument to the factory.

Spare Parts

Please state type and serial number of apparatus when spare parts are ordered.

Instruments and accessories necessary for service and repair:

Multimeter (50 µA)
Frequency Analyzer type 2107
Beat Frequency Oscillator type 1022
(Beat Frequency Oscillator type 1013)
Pistonphone type 4220
Cathode Follower type 2612/2613
Condenser Microphone type 4131/4132
(Frequency Counter)

Meter Circuit

valid from serial no. 116061

1.1. Mechanical Zero-Point

METER SWITCH: "Off"
POWER: "Off"

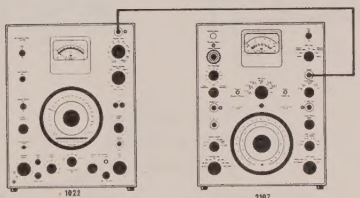
Adjust for zero deflection.

1.2. Electrical Zero-Point

METER RANGE: "10 V"
RANGE MULT.: "X 1"
POWER: "On"

Check that the instrument is still at zero deflection.

Tolerance: "1/2 pointer width".



1.3. Check of Meter Switch

a. METER SWITCH: "RMS fast"
POWER: "Off"

Frequency: 1000 Hz. Adjust the input voltage for a 16 dB deflection on type 2107.

b. METER SWITCH to "Average fast"

Deflection on type 2107: 14.9 - 15.3 dB.
If necessary adjust P 6.

c. METER SWITCH to "Peak fast"

Deflection on type 2107: 18.5 - 19.5 dB
If necessary adjust P 6 and repeat item b.

Also check a-b-c at 20 Hz in pos. "slow"
20.000 Hz in pos. "fast"

1.4. Sensitivity

METER SWITCH: "RMS fast"
POWER: "Off"

Frequency: 1000 Hz. Adjust the input voltage for a full scale deflection on type 2107. The input voltage from type 1022 should be within 8 - 11 V

Possible reason for fault: defective diodes Q9 - Q12.

If the cold cathode tube V14 is dark change both V14 and V5.

Whenever V5 is replaced P24 should be adjusted to V_k triode (pin 8, V5) is 105 V d.c.

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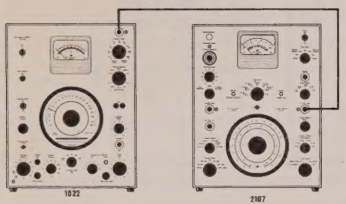
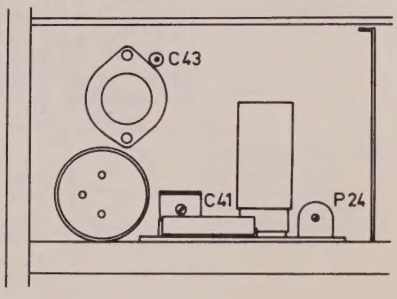
Output Amplifier

2107.2

valid from serial no. 78122





2.1 Sensitivity

INPUT SWITCH:"Direct"
WEIGHTING NETWORK:"Ext. Filter"
RANGE MULT.:"X 1"
METER SWITCH:"RMS"
FUNC. SELECTOR:"Selective Section Off"

Input signal: 1 V. 1000 Hz.

Deflection on type 2107: approx. 10 V.

If not check item 3.1.

2.2 Range Multiplier

INPUT SWITCH:"Direct"
WEIGHTING NETWORK:"Ext. Filter"
RANGE MULT.:"X 1"
METER SWITCH:"RMS"
FUNC. SELECTOR:"Selective Section Off"

Frequency: 1000 Hz. Adjust the input voltage for an 18 dB deflection on type 2107.

Check the steps of RANGE MULT. by comparison to type 1022.

Tolerance: $\pm$ 1% (+ tolerance of type 1022: o.2 dB)

Possible reasons for fault: defective tube V 4
defective resistor R 47-51

2.3. Frequency Response

a. INPUT SWITCH:"Direct"
WEIGHTING NETWORK:"Ext. Filter"
RANGE MULT.:"X o.3"
METER SWITCH:"RMS"
FUNC. SELECTOR:"Selective Section Off"

The apparatus must be placed in its case or in other way effectively screened. If the instrument is used at frequencies above 20ooo Hz trimmer C41 and C43 should be adjusted at 40ooo Hz which requires use of a high frequency oscillator f.inst. type 1013.

Frequency: 1000 Hz. Adjust the input voltage for an 18 dB deflection on type 2107.

Change frequency to 20ooo Hz.
Deflection on type 2107: 18 dB.

Tolerance: $\pm$ o.2 dB (+ tolerance of type 1022: o.3 dB)

If necessary adjust C 41

b. RANGE MULT.: to "X o.1"

As under item a, but adjust C43.

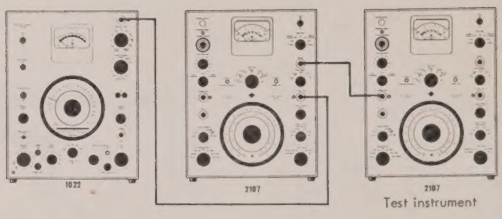
c. Check all steps of RANGE MULT.

Vary the frequency from 20 - 20ooo Hz and check the deflection on type 2107.

Tolerance: $\pm$ o.2 dB (+ tolerance of type 1022: o.3 dB)

Possible reasons for fault: defective tubes V4 - V5.

Whenever V5 is replaced P24 should be adjusted to V_k triode (pin 8. V5) is 105 V-d.c..



Test instrument

2.4. Output Impedance

INPUT SWITCH:"Direct"
WEIGHTING NETWORK:"Ext.Filter"
RANGE MULT.: "X 1"
METER SWITCH:"Peak"
FUNC.SELECTOR:"Selective Section Off"

Frequency: 1000 Hz. Adjust the input voltage for a 20 dB deflection on test instrument type 2107 (10 V Range)

When loading the RECORDER socket on type 2107 with a resistor of 1000 Ω the deflection should be within 19.5–20 dB on the test instrument type 2107.

If necessary adjust P 24 or change V 5 and check d.c. voltage on V5 pin 8: 95 - 115 V.

2.5. Output Voltage

a. INPUT SWITCH:"Direct"
WEIGHTING NETWORK:"Ext.Filter"
RANGE MULT:"X o.3"
METER SWITCH:"RMS"
FUNC.SELECTOR:"Selective Section Off"

Frequency: 1000 Hz. Adjust the input voltage for a 20 dB deflection on type 2107.

Output voltage on the RECORDER socket: 8 - 11 V

b. METER SWITCH to "Off"

If the input voltage is increased by 10 dB the output voltage should increase by 9.7 - 10.3 dB.

2.6 Noise - Hum

a. INPUT SWITCH:"Direct"
WEIGHTING NETWORK:"Ext.Filter"
RANGE MULT.:"X 1"
METER SWITCH:"RMS"
FUNC.SELECTOR:"Selective Section Off"

The apparatus must be placed in its case or in other way effectively screened.

Disconnect type 1022 and measure hum at line frequency and 2nd and 3rd harmonic.

Tolerance: max. 5 mV hum
max. 10 mV noise

b. RANGE MULT. to "X o.01"

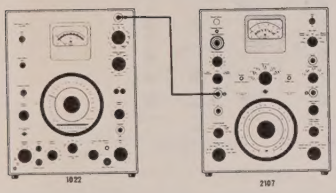
Tolerance: max. 10 mV hum
max. 20 mV noise

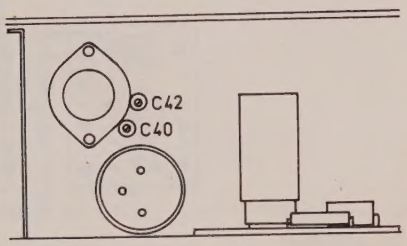
Possible reasons for fault: defective tube V4
defective transistor V20
defective diodes Q14-15

Input Amplifier

2107.3

valid from serial no. 78122





3.1. Sensitivity - Reference

a. INPUT SWITCH:"Direct"
METER RANGE:"10 V"
WEIGHTING NETWORK:"Lin.20-40ooo"
RANGE MULT.:"X 1"
METER SWITCH:"RMS"
FUNC.SELECTOR:"Selective Section Off"

Frequency: 1000 Hz. Adjust the input voltage to exactly 8 V.
Adjust P3 SEN. AMPL. INPUT for 8 V deflection on type 2107

b. METER RANGE to "Ref."

Adjust P1 for deflection to the red line on type 2107.

c. INPUT SWITCH to "Cond.Micr."

Adjust P2 SEN. COND. MICR. for deflection to the red line on type 2107.

3.2. Meter Range

INPUT SWITCH:"Direct"
METER RANGE:"10 V"
WEIGHTING NETWORK:"Lin.20-40ooo"
RANGE MULT.:"X 1"
METER SWITCH:"RMS"
FUNC.SELECTOR:"Selective Section Off"

Frequency: 1000 Hz. Adjust the input voltage for an 18 dB deflection on type 2107.

Check the steps of METER RANGE by comparison to type 1022.

Tolerance: $\pm$ 1.5% (+ tolerance of type 1022: 0.2 dB)

Possible reasons for fault: defective tube V1
defective resistors R41-46

3.3. Frequency Response

a. INPUT SWITCH:"Direct"
METER RANGE:"100 mV"
WEIGHTING NETWORK:"Lin.2-40ooo"
RANGE MULT.:"X 1"
METER SWITCH:"RMS"
FUNC.SELECTOR:"Selective Section Off"

The apparatus must be placed in its case or in other way effectively screened. If the instrument is used at frequencies above 20ooo Hz trimmer C40 and C42 should be adjusted at 40ooo Hz which requires use of a high frequency oscillator f.inst. type 1013.

Frequency: 1000 Hz. Adjust the input voltage for an 18 dB deflection on type 2107.

Change frequency to 20ooo Hz and adjust C42 for an 18 dB deflection on type 2107.

b. METER RANGE to "10 V"

As under item a but adjust C40 for an 18 dB deflection on type 2107.

c. Check all steps of METER RANGE

Vary the frequency from 20-20ooo Hz. and check the deflection on type 2107

Tolerance: $\pm$ 0.3 dB (+ tolerance of type 1022: 0.3 dB)

Possible reasons for fault: defective tubes V1 - V2.

3.4. Overload Indicator

INPUT SWITCH:"Direct"
METER RANGE:"1 V"

Input signal: 1 V 1000 Hz.

The indicator should light up if the input voltage increases by 9-11 dB.

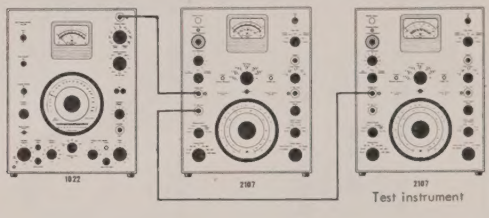
Also check at frequencies from 20-20ooo Hz.

3.5. Output Impedance

INPUT SWITCH:"Direct"
METER RANGE:"10 V"
WEIGHTING NETWORK:"Lin.2-40ooo"
RANGE MULT.:"X o.1"
METER SWITCH:"RMS"
FUNC.SELECTOR:"Selective Section Off"

Frequency: 1000 Hz. Adjust the input voltage for a 20 dB deflection on type 2107.

When loading the EXT.FILTER INPUT socket with a resistor of 50 Ω in series with a 50 µF capacitor the deflection on type 2107 should be within 19-20 dB..



Test instrument

3.6. Distortion

INPUT SWITCH:"Direct"
METER RANGE:"10 V"
WEIGHTING NETWORK:"Ext.Filter"

Distortion down to around o.5% can be measured by type 1022 and type 2107 only. Lower distortion requires the use of a filter type 1607 connected between the two types 2107 for rejection of fundamental frequency and a filter connected between type 1022 and 2107 to ensure that the distortion of the input signal is below o.01%.

If these filters are available check limits.

Adjust the input voltage for 1 V on EXT.FILTER INPUT socket which is loaded with a resistor of 500 Ω in series with a 50 µF capacitor.

Measure distortion at 40 - 1000 - 6500 Hz.

Tolerance: max. o.1% 2nd harmonic
max. o.1% 3rd harmonic

3.7. Noise - Hum

a. INPUT SWITCH:"Potentiometer"
METER RANGE:"10 mV"
WEIGHTING NETWORK:"Ext.Filter"
INPUT POTENTIOMETER:"10"

The apparatus must be placed in its case or in other way effectively screened.

Disconnect type 1022 and measure hum at line frequency and 2nd and 3rd harmonic.

Tolerance: max. 300 µV hum
max. 1.8 mV noise

b. INPUT POTENTIOMETER to "0"

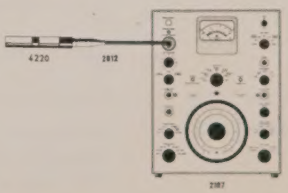
Tolerance: max. 300 µV hum
max. 500 µV noise

Possible reasons for fault: defective tube V1
defective resistor R31
defective transistor V20
defective diodes Q 14-15

3.8. Polarization Voltage

Connect a multimeter to POL.VOLTAGE socket and check the d.c. voltage: 200 V.

If necessary adjust P4



3.9. Acoustical Calibration

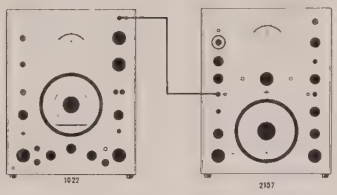
INPUT SWITCH:"Cond.Micr."
METER RANGE:"120 dB SL"
WEIGHTING NETWORK:"Lin.2-40ooo"
RANGE MULT:"-10 dB"
METER SWITCH:"RMS.fast"
FUNC.SELECTOR:"Selective Section Off"

Switch on the pistonphone and adjust P2 SEN.COND.MICR.until the deflection on type 2107 is equal to the SPL produced by the pistonphone with, for example, a pistonphone producing 124.1 dB the deflection should be 14.1dB

Weighting Network

2107.4

valid from serial no. 69858



4.1. Linear

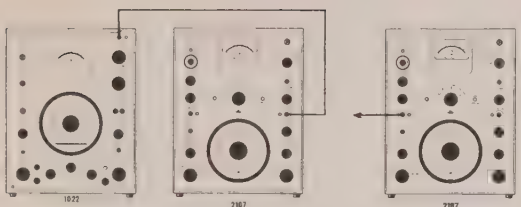
a. INPUT SWITCH:"Direct" METER RANGE:"10 V" WEIGHTING NETWORK:"Lin.2-40ooo" RANGE MULT.:"X 1" METER SWITCH:"RMS" FUNC.SELECTOR:"Selective Section Off"	Frequency: 1000 Hz. Adjust the input voltage for an 18 dB deflection on type 2107. Vary the frequency from 20 - 20ooo Hz. Deflection on type 2107: 18 dB Tolerance: $\pm$ o.3 dB (+ tolerance of type 1022: 0.3 dB)
b. METER RANGE to "Ref."	Adjust P3 SEN.AMPL.INPUT for a deflection to the red line on type 2107.
c. WEIGHTING NETWORK to "20 - 40ooo"	Adjust R99 for a deflection to the red line on type 2107. Tolerance: $\pm$ o.05 dB

4.2 Curve A-B-C

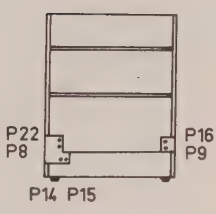
a. INPUT SWITCH:"Direct" METER RANGE:"10 V" WEIGHTING NETWORK:"Lin.2-40ooo" RANGE MULT.:"X 1" METER SWITCH:"RMS" FUNC.SELECTOR:"Selective Section Off"	Frequency: 1000 Hz. Adjust the input voltage for an 18 dB deflection on type 2107.
b. WEIGHTING NETWORK to curve "A"	Adjust R 98 for an 18 dB deflection on type 2107
c. WEIGHTING NETWORK to curve "B"	Adjust R97 for an 18 dB deflection on type 2107
d. WEIGHTING NETWORK to curve "C"	Adjust R 94 for an 18 dB deflection on type 2107

e.

Freq.	Curve "A" Defl.on type 2107	Range Mult.	Curve "B" Defl. on type 2107	Range Mult.	Curve "C" Defl. on type 2107	Range Mult.
Hz	dB		dB		dB	
20	4.6-12.6	X o.01	10.6-18.6	X o.1	8.7-16.7	X 1
63	10.4-13.9	X o.1	7.1-10.6	X 1	15.7-19.2	X 1
500	14.4-15.2	X 1	17.3-18.1	X 1	17.6-18.4	X 1
1000	17.7-18.3	X 1	17.7-18.3	X 1	17.7-18.3	X 1
2000	19.0-19.4	X 1	17.6-18.0	X 1	17.6-18.0	X 1
8000	15.7-17.4	X 1	13.8-15.5	X 1	13.8-15.5	X 1
20ooo	6.8-10.3	X 1	15.0-18.5	X o.3	14.9-18.4	X o.3



Test instrument



Attention: Item 5.1 and 5.4 require use of a frequency counter connected to type 1022 as the accuracy of the frequency should be within o.1%.
Before adjustment see 2107.7, sheet 3.

5.1. Frequency Scale 630 - 2000 Hz.

a. WEIGHTING NETWORK:"Ext.Filter"
RANGE MULT.:"X 1"
METER SWITCH:"RMS.fast"
OCTAVE SELECTIVITY:"40 dB"
FREQ.RANGE:"630 - 2000"
FUNC.SELECTOR:"Freq.Analysis"

a. Input signal: 1 V 2000 Hz.

Short-circuit measuring point II to ground.
Adjust FREQUENCY TUNING to max.deflection on type 2107.

Check pointer position on frequency scale: 2000 Hz.
Tolerance: ± 1%.

If necessary, measure the voltage across measuring point 1 and ground. Adjust FREQUENCY TUNING to min. voltage and P8 to 0 V a.c.
If the pointer has been removed, fix it in position 2000 Hz.

b. Change frequency to 650 Hz.

Adjust FREQUENCY TUNING to max.deflection on type 2107.

Check pointer position on frequency scale: 650 Hz.
Tolerance: ± 1%.

If necessary, set FREQUENCY TUNING to 650 Hz and adjust P 17 and P 18 to min. voltage a.c. across measuring point 1 and ground.

c. Change frequency to 2000 Hz.

Short-circuit measuring point 1 to ground and disconnect the short-circuit from measuring point II.

Adjust FREQUENCY TUNING to max.deflection on type 2107.

Check pointer position on frequency scale: 2000 Hz.
Tolerance: ± 1%.

If necessary, set FREQUENCY TUNING to 2000 Hz and adjust P 9 to min voltage a.c. across measuring point II and ground.

d. Change frequency to 650 Hz.

Adjust FREQUENCY TUNING to max.deflection on type 2107.

Check pointer position on frequency scale: 650 Hz.
Tolerance: ± 1%.

If necessary, set FREQUENCY TUNING to 650 Hz and adjust P 19 and P 20 to min.voltage a.c. across measuring point II and ground.

e. Remove short-circuit from measuring point 1 and check frequency scale at 650, 1000 and 2000 Hz.

Tolerance: ± 1%.

5.2. Sensitivity Analysis

a. WEIGHTING NETWORK:"Ext.Filter"
RANGE MULT.:"X 1"
METER SWITCH:"RMS.fast"
OCTAVE SELECTIVITY:"40 dB"
FREQ.RANGE:"630 - 2000"
FUNC.SELECTOR:"Selective Section Off"
FREQUENCY TUNING:"2000"

Short-circuit measuring point 1 and II to ground.

Frequency: 2000 Hz. Adjust the input voltage for an 18 dB deflection on type 2107.

b. FUNC.SELECTOR to "Freq.Analysis"

Deflection on type 2107: 17.8 dB.
If necessary adjust P 15.

5.3. Octave Selectivity.

a. WEIGHTING NETWORK:"Ext.Filter"
RANGE MULT.:"X 1"
METER SWITCH:"RMS.fast"
OCTAVE SELECTIVITY:"40 dB"
FREQ.RANGE:"630 - 2000"
FUNC.SELECTOR:"Selective Section Off"
FREQUENCY TUNING:"2000"

Frequency: 1000 Hz. Adjust the input voltage for an 18 dB deflection on type 2107.

b. FUNC.SELECTOR to "Freq.Analysis"
RANGE MULT.:"X o.01"

Deflection on type 2107: 17 - 19 dB.

If necessary, short-circuit measuring point II to ground, and adjust P 21 for an 18 dB deflection on type 2107 (RANGE MULT.: X o.1).

Short-circuit measuring point 1 to ground and adjust P 23 for an 18 dB deflection on type 2107 (RANGE MULT.:X o.1).

c. OCTAVE SELECTIVITY to "35 dB"
RANGE MULT. to "X o.03"

Deflection on type 2107: 11 - 15 dB.

d. OCTAVE SELECTIVITY to "30 dB"

Deflection on type 2107: 16 - 20 dB.

e. OCTAVE SELECTIVITY to "25 dB
RANGE MULT. to "X o.1"

Deflection on type 2107: 11 - 15 dB.

f. OCTAVE SELECTIVITY to "20 dB"

Deflection on type 2107: 16 - 20 dB.

5.4. Frequency Scale 6300 - 20ooo Hz.

a. WEIGHTING NETWORK:"Ext.Filter"
RANGE MULT.:"X 1"
METER SWITCH:"RMS.fast"
OCTAVE SELECTIVITY:"40 dB"
FREQ.RANGE:"6300 - 20ooo"
FUNC.SELECTOR:"Freq.Analysis"

a. Input signal: 1 V. 20ooo Hz.

Short-circuit measuring point II to ground.

Adjust FREQUENCY TUNING to max.deflection on type 2107.

Check pointer position on frequency scale: 20ooo Hz.
Tolerance: ± 1%.

If necessary, set FREQUENCY TUNING to 20ooo Hz and adjust C 101 and C 102 to min.voltage a.c. across measuring point 1 and ground.

b. Change frequency to 6500 Hz.

Adjust FREQUENCY TUNING to max.deflection on type 2107.

Check pointer position on frequency scale: 6500 Hz.
Tolerance: ± 1%.

If the pointer position is out of tolerance, set the pointer to twice of this deviation and adjust C 59 to min.voltage a.c. across measuring point 1 and ground.

After this adjustment recheck item a and b.

c. Change frequency to 20ooo Hz.

Short-circuit measuring point 1 to ground and disconnect the short-circuit from measuring point II

Adjust FREQUENCY TUNING to max.deflection on type 2107.

Check pointer position on frequency scale: 20ooo Hz.
Tolerance: ± 1%.

If necessary, set FREQUENCY TUNING to 20ooo Hz and adjust C 103 and C 104 to min.voltage a.c. across measuring point II and ground.

d. Change frequency to 6500 Hz.

Adjust FREQUENCY TUNING to max.deflection on type 2107.

Check pointer position on frequency scale: 6500 Hz
Tolerance: ± 1%.

If the pointer position is out of tolerance, set the pointer to twice of this deviation and adjust C 60 to min. voltage across measuring point II and ground.

After this adjustment recheck item c and d.

e. Remove short-circuit from measuring point 1 and check frequency scale at 6500, 10ooo and 20ooo Hz.
Tolerance: ± 1%.

5.5. Frequency Response.

a. WEIGHTING NETWORK:"Ext.Filter"
RANGE MULT.:"X 1"
METER SWITCH:"RMS.fast"
OCTAVE SELECTIVITY:"40 dB"
FREQ.RANGE:"20 - 63"
FUNC.SELECTOR:"Selective Section Off"
FREQUENCY TUNING:"63"

Frequency: 1000 Hz. Adjust the input voltage for an 18 dB deflection on type 2107.

b. FUNC.SELECTOR to "Freq.Rejection"

Vary the frequency from 1000 - 20000 Hz.
Deflection on type 2107: 18 dB.
Tolerance: ± 0.5 dB (+ tolerance of type 1022: 0.3 dB).
If necessary change value of C 95

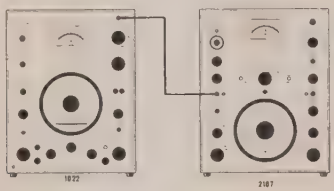
If the instrument is used at frequencies above 20000 Hz C 95 should be adjusted at 40000 Hz which requires use of a high frequency oscillator f.inst. type 1013.

c. FREQ.RANGE to "6300 - 20000"
FUNC.SELECTOR to "Selective Section Off"
FREQUENCY TUNING to "20000"

Short-circuit measuring point I and II to ground.
Frequency: 20000 Hz. Adjust the input voltage for an 18 dB deflection on type 2107.

d. FUNC.SELECTOR to "Freq.Analysis"

Deflection on type 2107: 17.8 dB.
If necessary change value of C 63.



5.6. Reference.

a. INPUT SWITCH:"Direct"
METER RANGE:"10 V"
WEIGHTING NETWORK:"Lin.2-40000"
RANGE MULT.:"X 1"
METER SWITCH:"RMS.fast"
OCTAVE SELECTIVITY:"20 dB"
FREQ.RANGE:"20 - 63"
FUNC.SELECTOR:"Selective Section Off"

Input signal: 8 V. 1000 Hz.
Adjust P 3 SEN.AMPL.INPUT to 8 V deflection on type 2107.

b. METER RANGE to "Ref."

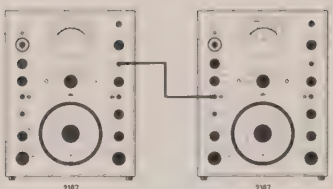
Adjust P 1 for a deflection to the red line on type 2107.

c. FUNC.SELECTOR to "Freq.Analysis"

Set FREQUENCY TUNING to line frequency.
Adjust P 22 for a deflection to the red line on type 2107.

d. FUNC.SELECTOR to "Freq.Rejection"
FREQ.RANGE to "6300 - 20000"

Adjust P 14 for a deflection to the red line on type 2107.



Test instrument

5.7. Hum.

a. INPUT SWITCH:"Direct"
METER RANGE:"10 mV"
WEIGHTING NETWORK:"Lin.20-40000"
RANGE MULT:"X 0.01"
METER SWITCH:"RMS.fast"
OCTAVE SELECTIVITY:"40 dB"
FREQ.RANGE:"20 - 63"
FUNC.SELECTOR:"Freq.Analysis"

Measure hum at line frequency and 2nd harmonic.

Adjust FREQUENCY TUNING on both instruments to max. deflection on the meter of type 2107 (test instrument).

Hum: max. 500 mV.
If necessary adjust P 16.

b. RANGE MULT. to "X 1"

Hum: max. 10 mV.

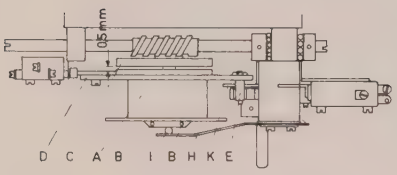


Fig. 1

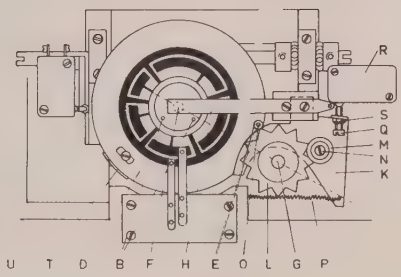


Fig. 2

6.1. Electromagnetic Clutch.

After disassembling the electromagnet A should be fastened to the potentiometer axle by means of one of the two screws B in a position of approx. 0.5 mm from the other part C of the clutch.

Then mount the clutch disc D on the electromagnet A.

Turn the clutch disc D to a position, where the roller E is placed on a line between the axles F and G.

Loosen the screw B and turn the FREQUENCY TUNING until the frequency pointer is placed exactly in the middle between beginning and end of the frequency scale, then tighten the screws B.

Mount the contact arm H and the small steelball 1 and check the proper function of the clutch.

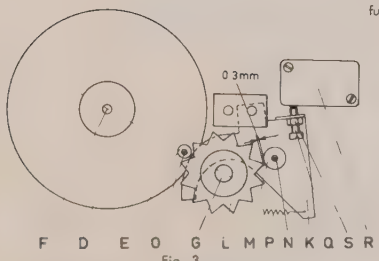


Fig. 3

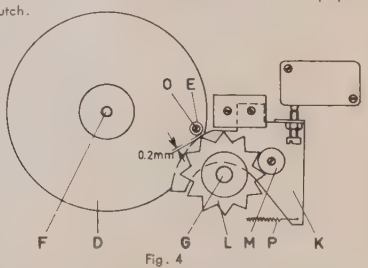


Fig. 4

6.2. Mechanical Scanning Mechanism.

The potentiometer axle should move smoothly and the clutch disc D must not touch the pawl plate K.

Turn the clutch disc D to a position, where the roller E is placed on a line between the axles F and G (Fig. 3).

The distance between the nylon roller M and one of the teeth on the toothed wheel L should be 0.3 mm. The distance can be adjusted by the eccentric pin N.

Slowly turn the clutch disc D through the switching period and watch the movement of the nylon roller M. When switching is completed the nylon roller M should move down between two teeth on the toothed wheel L without moving it more than 0.3 mm measured at the top of the teeth.

Check the movement of the toothed wheel L turning the clutch disc D both clockwise and anticlockwise.

Turning the clutch disc to the beginning of the switching period the distance between one of the teeth of the toothed wheel L and the roller E must not be smaller than 0.2 mm (Fig. 4).

The distance can be adjusted by the eccentric pin O.

Check the distance turning the clutch disc D both clockwise and anticlockwise.

The tension of the spring P should be high enough to turn the toothed wheel L back to its locked position, if it is turned 5° out of this position.

6.3. Microswitch.

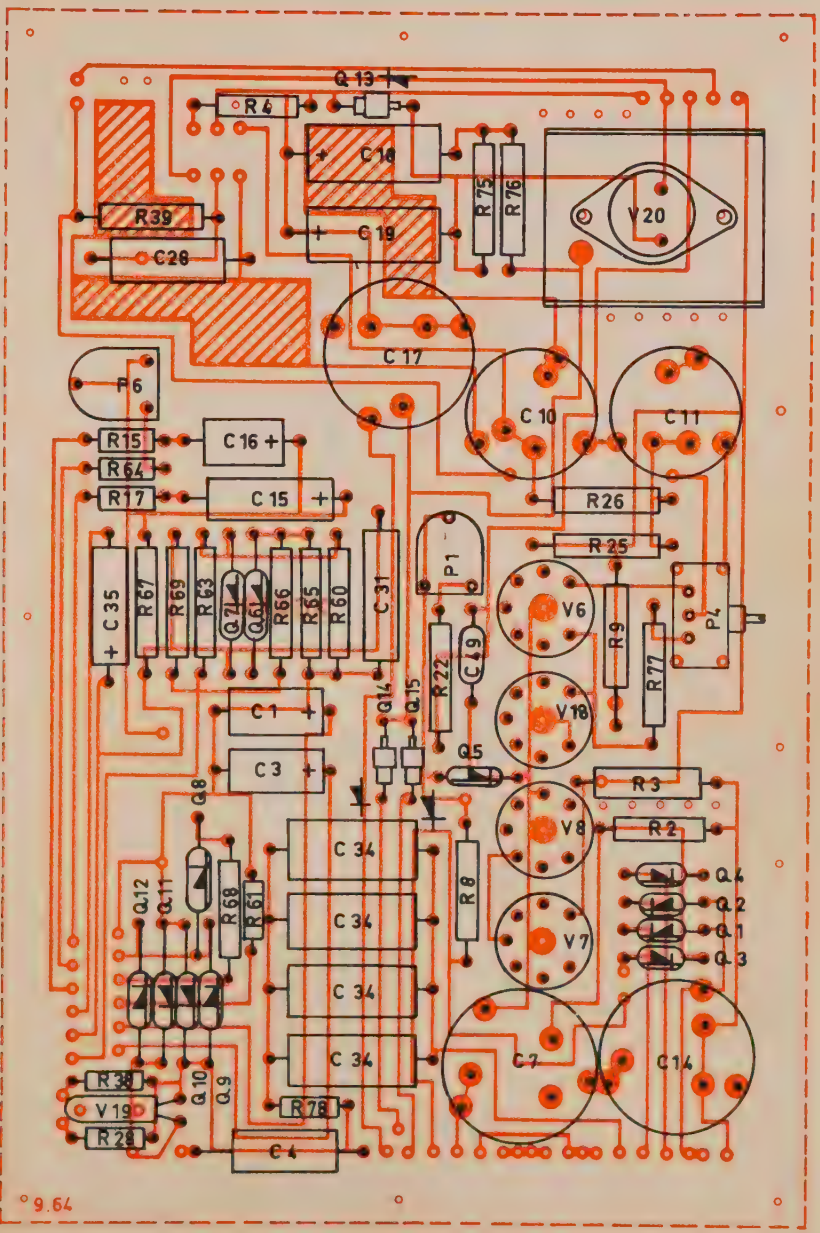
Turn the clutch disc D to a position, where the roller E is placed on a line between the axles F and G (Fig.3).

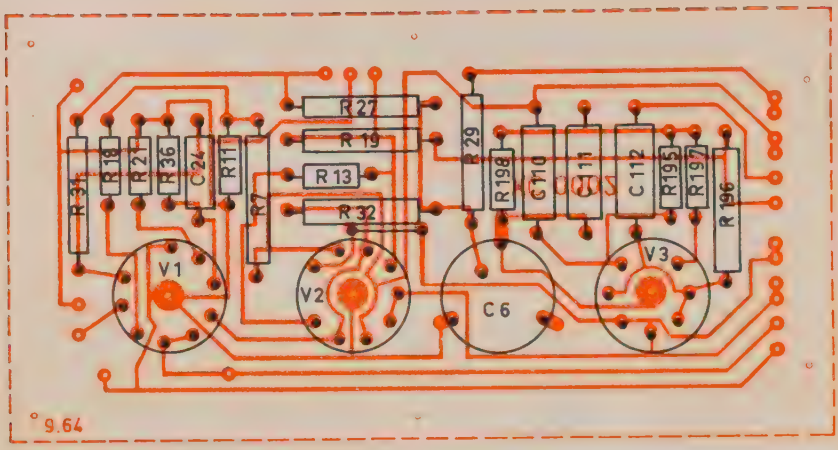
Adjust the screw Q to a point, where the switch R is just switched on. Then turn the screw Q 1 1/2 turns more and lock it with the nut S.

Adjust the contact cam T in relation to the clutch disc D switching the switch U off at the beginning and on the end of the frequency scale.

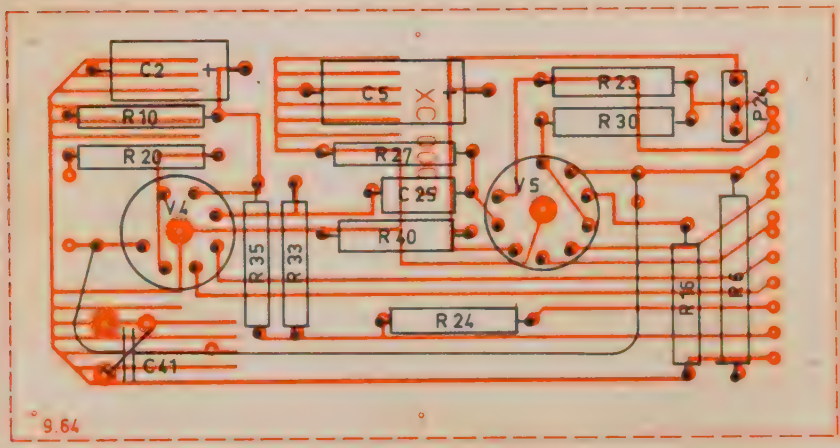
Position of Components

valid from serial no. 132953

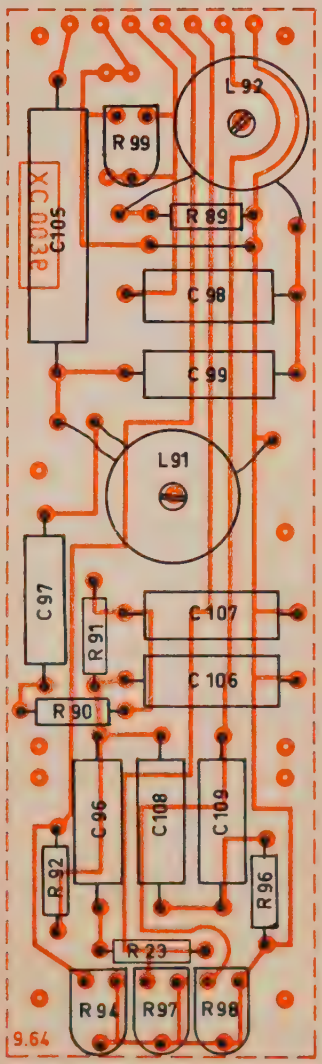




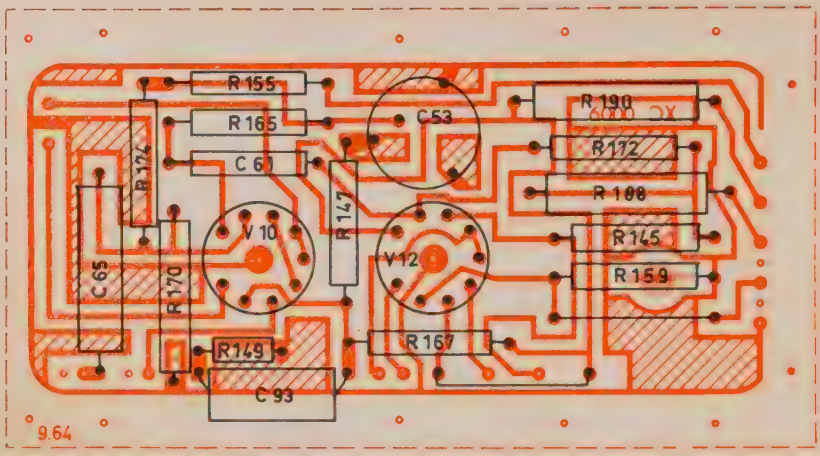
Input Amplifier



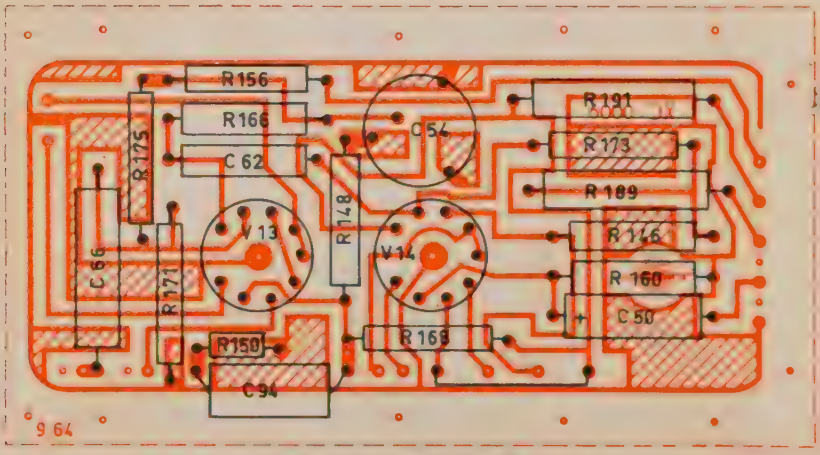
Output Amplifier



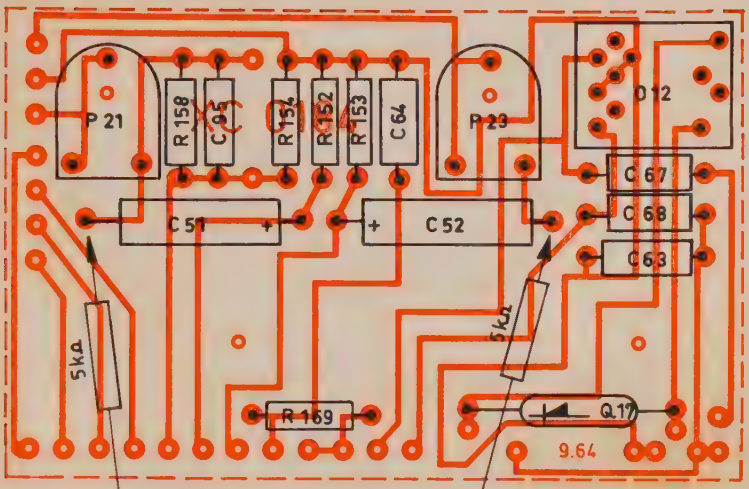
Weighting Network



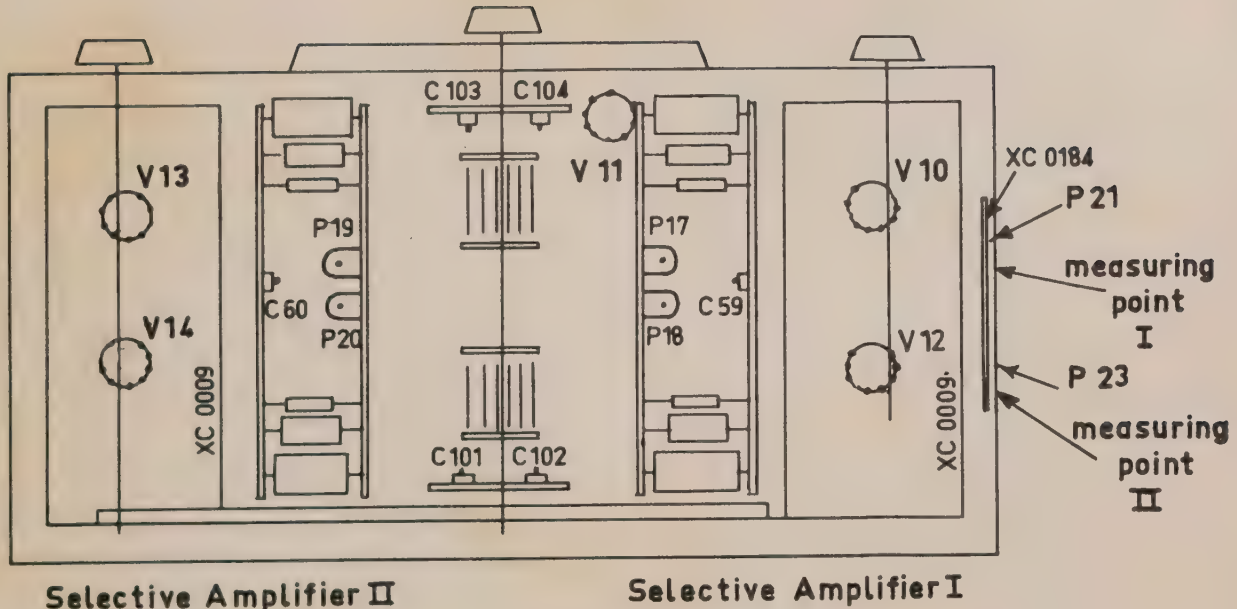
Selective Amplifier I



Selective Amplifier II



Solder on a 5kΩ resistor to measuring point I and II
When the feedback voltage should be short-circuited to ground, connect measuring point direct to ground.
When the feedback voltage should be measured, connect the VTVM to the 5kΩ resistor.


C 103
C 104
V 11
V 13
V 14
V 10
V 12
P19
P20
P17
P18
C 60
C 59
C101
C102
XC 0009
XC 0009
XC 0184
P 21
measuring point I
P 23
measuring point II
Selective Amplifier II
Selective Amplifier I

Parts-List

2107.8

valid from serial no. 132953

COMPONENT TYPE		STOCK REFERENCE	CIRCUIT DIAGRAM REF.
CAPACITORS:			
Electrolytic	16 µF/450 V	CE 6846	C 6,53,54
"	50 µF/450 V	CE 0901	C 7
"	100 + 100 µF/450 V	CE 0902	C 14
"	100 + 200 µF/350 V	CE 6880	C 8,9,55 - 58
"	100 + 100 µF/350 V	CE 2989	C 12,13
"	8 µF/320 V	CE 0802	C 2
"	4 µF/250 V	CE 2034	C 1,50
"	2 x 50 µF/250 V	CE 0706	C 10,11
"	40 µF/150 V	CE 2038	C 5
"	16 µF/ 63 V	CE 0504	C 35,51,52
"	50 µF/ 50 V	CE 0503	C 3
"	24 µF/ 25 V	CE 3520	C 4
"	250 µF/ 25 V	CE 8919	C 18,19
"	1000 + 1000 µF/ 25 V	CE 0402	C 17
"	200 µF/ 6 V	CE 8944	C 15
"	500 µF/ 6 V	CE 0201	C 16
Ceramic	1 pF/500 V	CK 0100	C 21,32
"	25 pF/500 V	CK 0039	C 113,114
"	75 pF/500 V	CK 0051	C 115-118
"	4.7 nF/500 V	CK 3470	C 27
Paper	0.1 µF/400 V	CP 6463	C 26
"	0.25 µF/400 V	CP 1722	C 29,30
Polyester	4.7 nF/400 V	CS 0122	C 49
"	10 nF/400 V	CS 0101	C 61,62
"	22 nF/400 V	CS 0105	C 24,25
"	68 nF/400 V	CS 0111	C 65,66
"	68 nF/250 V	CS 0011	C 67,68
"	0.1 µF/250 V	CS 0013	C 64,110-112
"	0.15 µF/250 V	CS 0015	C 100
"	1 µF/250 V	CS 0025	C 28,31
"	2 µF/250 V	CS 0028	C 34
Polystyrene	125 pF/500 V	CT 0104	C 23
"	150 pF/500 V	CT 0105	C 95
"	250 pF/500 V	CT 0108	C 22
"	1 nF/400 V	CT 1018	C 63
"	4 nF/200 V	CT 3225	C 93,94
"	20 nF +0 -1% /200 V	CT 3333	C 77-80
"	63.2 nF " /200 V	CT 3336	C 81-84
"	200 nF " /200 V	CT 3339	C 85-88
	632 nF " /200 V	CT 3342	C 89-92
	1.92 nF +2% -2% /200 V	CT 3343	C 69-72
	6.24 nF " /200 V	CT 3344	C 73-76
Trimmer		CV 0013	C 41
"	10 - 40 pF/250 V	CV 0019	C 59,60,101-104
"	0.7 - 3 pF/400 V	CV 0113	C 40
"	0.8 - 6 pF/400 V	CV 0112	C 42,43
SWITCHES:			
Power ON - OFF		NN 0563	N
Power Voltage Selector		OA 0021	O 6
Function Selector		OR 2107	O 9
Input Switch		OR 2603	O 1
Weighting Network		OS 2107	O 3
Meter Switch		OS 2112	O 5
Octave Selectivity		OT 2107	O 7
Range Multiplier		OT 2109	O 4
Frequency Range		OU 2107	O 8
Meter Range		OV 2110	O 2
Relay		OC 0005	O 12
POTENTIOMETERS:			
Input Potm.	carbon 1 MΩ log. PP	5100	P 5
Freq.Rej.balance	wire 200 Ω lin. PR	1200	P 7
Freq.Tuning	wire 4 x 10 kΩ lin. PX	2107	P 10-13

COMPONENT TYPE		STOCK REFERENCE	CIRCUIT DIAGRAM REF.
POTENTIOMETERS:			
Trimmer Potm.	Carbon 5 kΩ lin. PG	2500	P 6,21,23
"	" 25 kΩ lin. PH	3250	P 14,15
"	" 50 kΩ lin. PG	3501	P 1
"	" 50 kΩ lin. PB	3501	P 4
"	" 150 kΩ lin. PG	4151	P 94
"	" 200 kΩ lin. PG	4202	P 24
"	" 300 kΩ lin. PG	4301	P 97-99
"	" 1MΩ lin. PG	5104	P 17-20
Trimmer Potm.	Wire 100 Ω lin. PQ	1100	P 2,3,22
"	" 200 Ω lin. PQ	1200	P 8,9
"	" 1 kΩ lin. PQ	2100	P 16
RECTIFIERS:			
Germanium Diode	OA79	QV 0078	Q 7
"	OA85	QV 0085	Q 6,8,16,17
"	150V	QV 0020	Q 9-12
Silicon Diode	50 V/0.6 A	QV 0501	Q 14,15
"	1000 V/0.15 A	QV 0023	Q 1-4
Zener Diode	6.8 V/30 mA	QV 1106	Q 5
"	13 V/15 mA	QV 1316	Q 13
RESISTORS:			
Carbon Film	1/2 W ± 10%	RK 100 Ω	R 75,76
"	" "	RK 200 Ω	R 12,145,146
"	" "	RK 800 Ω	R 16
"	" "	RK 1 kΩ	R 147,148
"	" "	RK 1.25 kΩ	R 19
"	" "	RK 1.6 kΩ	R 20
"	" "	RK 3.15 kΩ	R 180-183
"	" "	RK 20 kΩ	R 9,23
"	" "	RK 31.5 kΩ	R 8,24 - 26
"	" "	RK 40 kΩ	R 155,156
"	" "	RK 50 kΩ	R 27,40,196
"	" "	RK 100 kΩ	R 29,77,165,166
"	" "	RK 125 kΩ	R 10,30
"	" "	RK 250 kΩ	R 35,167,168
"	" "	RK 315 kΩ	R 31,33
"	" "	RK 2.5MΩ	R 172,173
"	" "	RK 3.15MΩ	R 37
"	" "	RK 25MΩ	R 39
"	" 5%	RK 86 kΩ	R 22
"	" "	RK 125 kΩ	R 159,160
"	" "	RK 315 kΩ	R 32
"	" 2%	RK 2.3MΩ	R 170,171
"	" "	RK 4MΩ	R 174,175
"	1/3 W ± 10%	RK 50 Ω	R 13,78
"	" "	RK 160 Ω	R 15
"	" "	RK 500 Ω	R 149,150
"	" "	RK 1 kΩ	R 18
"	" "	RK 2.5 kΩ	R 17
"	" "	RK 6.3 kΩ	R 64
"	" "	RK 7 kΩ	R 61
"	" "	RK 112 kΩ	R 38
"	" "	RK 800 kΩ	R 14
"	" "	RK 3.15MΩ	R 36
"	" "	RK 5MΩ	R 195
"	" "	RK 10MΩ	R 100,169
"	" 5%	RK 56 Ω	R 11
"	" "	RK 500 Ω	R 198
"	" "	RK 800 Ω	R 197
"	" "	RK 2.5 kΩ	R 21
"	" "	RK 8 kΩ	R 154
"	" "	RK 16 kΩ	R 152,153
"	" "	RK 28 kΩ	R 158
"	" -2%+3%	RK 63 kΩ	R 28

COMPONENT TYPE		STOCK REFERENCE	CIRCUIT DIAGRAM REF.
RESISTORS:			
Wire-wound	8 W 1.8 kΩ	RX 0400	R 3
"	5.5 W 30 Ω	RX 0309	R 4
"	5.5 W 330 Ω	RX 0300	R 2
"	5.5 W 6.2 kΩ	RX 0303	R 7
"	3 W 7 kΩ	RO 0803	R 6
"	3 W 5 kΩ+11 kΩ	RO 1002	R 188-191
PRECISION RESISTORS:			
Carbon Film	1/2 W ± o.5%	RK 22.2 Ω	R 41
"	" "	RK 200 Ω	R 42
"	" "	RK 2 kΩ	R 43
"	" "	RK 2.66 kΩ	R 60
"	" "	RK 8.9 kΩ	R 63
"	" "	RK 14.6 kΩ	R 47
"	" "	RK 17.6 kΩ	R 65
"	" "	RK 19.7 kΩ	R 66
"	" "	RK 20 kΩ	R 44
"	" "	RK 23.7 kΩ	R 67
"	" "	RK 31.6 kΩ	R 48
"	" "	RK 34.3 kΩ	R 68
"	" "	RK 49 kΩ	R 69
"	" "	RK 100 kΩ	R 49
"	" "	RK 200 kΩ	R 45
"	" "	RK 316 kΩ	R 50
"	" "	RK 1MΩ	R 51
"	" "	RK 2MΩ	R 46
"	1/3 W ± 1%	RK 1.41 kΩ	R 130, 131
"	" "	RK 1.88 kΩ	R 132, 133
"	" "	RK 2.51 kΩ	R 134, 135
"	" "	RK 3.35 kΩ	R 136, 137
"	" "	RK 3.44 kΩ	R 140, 141
"	" "	RK 3.46 kΩ	R 138, 139
TUBES, TRANSISTORS:			
Twin Triode	ECC81/12AT7	VA 0010	V 2, 10-14
"	ECC83/12AX7	VA 0012	V 1
Triode Pentode	ECF82/6U8	VA 0014	V 5
Pentode	EF94 /6AU8	VA 0021	V 3
"	"	VA 0070	V 4
Stabilizer	OA2	VA 0037	V 7
"	OB2	VA 0040	V 6, 8, 18
Cold Cathode Tube 90 V		VA 0072	V 19
Transistor	2N554	VB 0023	V 20
Fuse	1.5 A	VF 0007	V 9
Neon Lamp		VS 8001	V 15
Meter Lamp	6.3 V/o.5 A	VS 1271	V 16
Dial Lamp	6.3 V/o.3 A	VS 8024	V 17
PRINTED CIRCUIT:			
Input Amplifier		XC 0002	
Output Amplifier		XC 0003	
Selective Amplifier		XC 0009	
Frequency Range		XC 0120	
Power Supply		XC 0193	
Selectivity Adjustment		XC 0184	
XC 0002 with components		2107 bl. 801	
XC 0003 "		2107 bl. 802	
XC 0009 "	Selec. Ampl. I	2107 bl. 810	
XC 0009 "	Selec. Ampl. II	2107 bl. 811	
XC 0193 "		2107 bl. 800	
XC 0184 "		2107 bl. 815	
MISCELLANEOUS:			
Power Cord. EUR.		AN 0005	
" USA		AN 0006	
Moving Coil Meter		IM 2604	I
Coaxial Jack		JJ 0115	
Microphone Jack		JJ 0016	
Coaxial Plug		JP 0018	
3-pin Plug		JP 4701	
Ground Jack		JT 6204	
Insulated Jack		JT 8344	

COMPONENT TYPE	STOCK REFERENCE	CIRCUIT DIAGRAM REF.
MISCELLANEOUS:		
Socket for V 3,4,6,7,8,18	JV 7505	
" V 11	JV 9011	
" V 1,2,5,10,12,13,14	JV 9012	
Cabinet, wood	KA 0010	
Cabinet, metal	KQ 0016	
Plastic Cover	KF 0028	
Coil for Magnetic Clutch	LB 1005	
Bakelite Knob, 30 mm	SN 0814	
" 40 mm	SN 0989	
" 53 mm	SN 1013	
" twin marking	SN 0991	
Power Transformer	TN 0002	I
Weighting Network	ZS 0017	